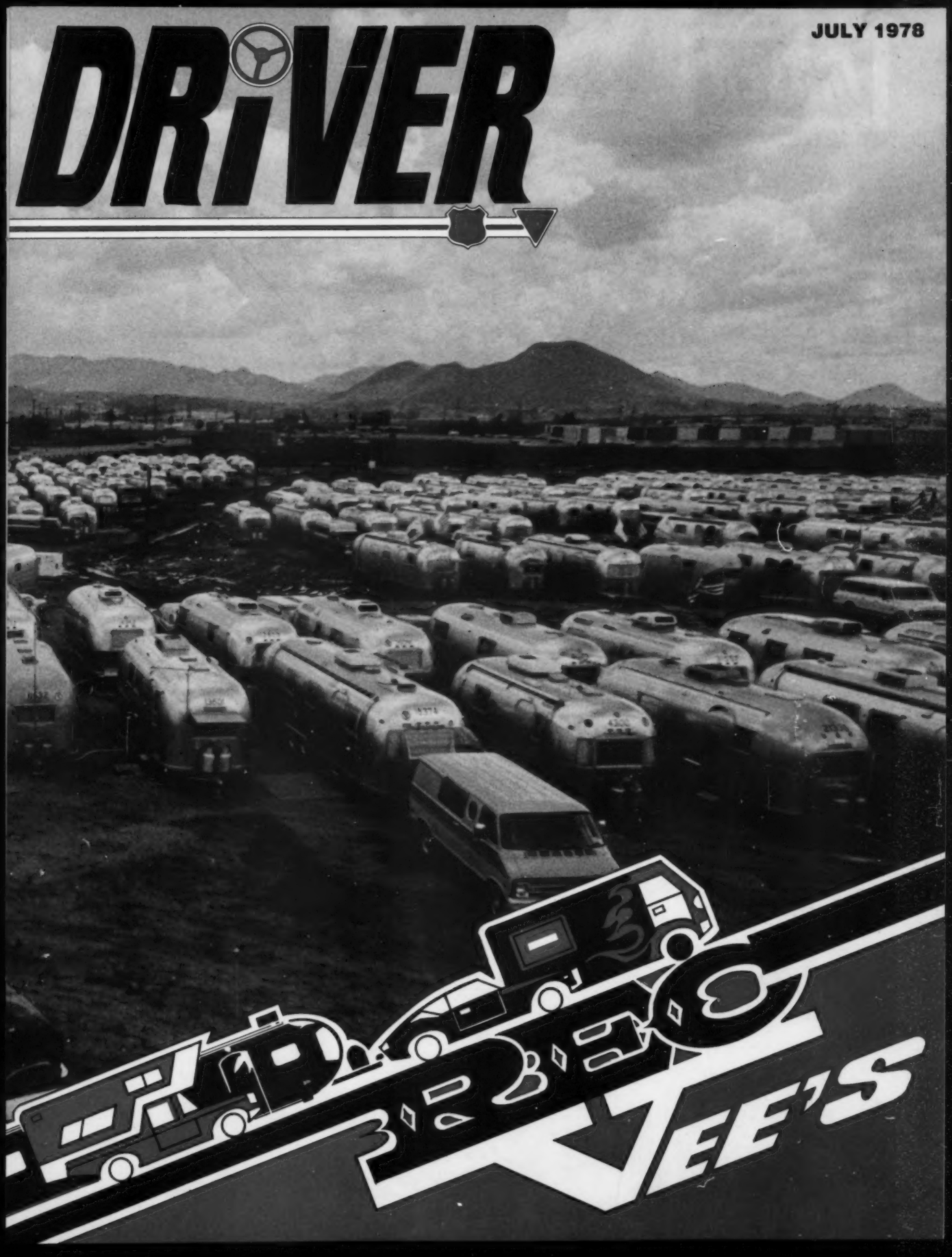
DRiVER

JULY 1978



DRiVER

some RVA

Did you think hauling a recreational vehicle was as simple as tying your little red wagon to your tricycle with a rope?

It's a large family get-together. *Too* large. With relatives from all over the country, there are too many guests to allow everyone a place to sleep, even at Uncle Charlie's huge house.

"Hey, I've got a great idea," says Charlie to his brother, Fred. "Why don't you and Joey sleep in my van? It's pretty large, and there's a good double bed. There's windows for ventilation and a sink. You'll be very comfortable, I'm sure. It'll be just like going camping."

Fred is doubtful, but he and little Joey bathe, get their pajamas and bid the family goodnight. On the way out to the van, Fred remembers why Charlie always has the air conditioning full blast in the house. In the time it takes them to tiptoe across 50 feet of sharp stones in the driveway, they are soaked in sweat by the humid, 90 degree Nebraska night air.

Cs

Fred wonders if it *ever* cools off around there. He suggests they dispense with the pajamas and sleep in their underwear, despite the nearby houses. Inside the van they find a double bed with a mattress about half-an-inch thick, sheets, pillows, and a thin cotton blanket. Fred wads up the blanket and throws it into a corner.

"Gee, this is fun, Dad! says Joey, who is only eight and doesn't know any better. "Why don't we get one of these to go camping in?"

Fred grumbles as he discovers the small pump-operated sink has no water supply. He opens the camper windows to allow a non-existent breeze to blow through, Finally, he decides he doesn't care *who* sees him in his Munsingwear and pushes back the curtains. One of the springs used as a curtain rod breaks and the curtain hits him in the face. He stuffs it out the window and lies down to wait for the mosquitoes. Joey has fallen asleep. . . .

The next year Uncle Charlie comes to visit Fred in Nevada. He has traded his van in on a large pickup with an even larger camper. Fred notices a severe gash in the cabover part of the camper.

"Oh, I went to one of those little photo-finishing stands and I didn't like the way it was sitting, so I moved it around on its foundation a little. Ha, ha, ha!" says Charlie. Fred wonders how Charlie has managed to live so long.

Charlie shows him the accommodations in the camper. There is a small kitchen area, a dining area, comfortable sleeping accommodations for four, and even a toilet.

Joey, who is nine by this time but still doesn't know any better, says, "Gee, Dad, why don't we get one of these? Then we could visit Uncle Charlie a lot!"

Fred resolves to cut Joey's allowance in half.

Another year passes, and Charlie again visits. This time he pulls up in a pickup truck which is towing a trailer that totally obscures Fred's view of the street. It occurs to Fred that Charlie must have spent unknown thousands of dollars on the trailer. It is a fifth-wheel trailer, complete with sleeping accommodations for eight, a full bath, four-burner stove, refrigerator, a living room with a television, AM/FM 8-track stereo and bookshelves, and . . . air conditioning.

Uncle Charlie's driving skill hasn't improved any, and he has broken off all the tree limbs on the street side of Fred's house.

Charlie gives them the grand tour, pointing out the fact that he has creature comforts in the trailer that Fred doesn't have in his own house.

"Well, what do you think Joey?" asks Charlie as they emerge from the palace-on-wheels.

"Oh, it's okay, Uncle Charlie," says Joey, who is now 10. "But if you wanted all that stuff, why'd you leave home?" He skips off to find his football.

The kid's going to be all right, thinks Fred. I wonder if that fishing reel he wanted is on sale. . . .

Is an RV for Me? Fred's problem was that he had been introduced to recreational vehicles by a nut. As with any group, RVers have their share of nuts and, as with any group, they are the minority. If he had been taken on a trip by brother Charlie he might have gained a different view of recreational vehicles. He might not have wanted the luxurious fifth-wheeler, but he might have become interested in another of the varieties of RVs.

There is almost something for everyone, from the small, fold-down tent trailers to the 35-foot travel trailers.

continued

DRIVER

THE
TRAFFIC SAFETY MAGAZINE
FOR THE MILITARY DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION AND SAFETY CENTER
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JUL

VOLUME 12 NUMBER 2

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THE EDITOR SPEAKS
DOUBLE CLUTCH

TRANSACTIONAL ANALYSIS AND DRIVING

If you've been to a management class lately, or if you've read the best-selling "I'm OK, You're OK," then you know about the theory that each of us at different times plays different roles: The parent, the child, and the adult. This popular psychology is called transactional analysis.

The transactional approach to modifying driving behavior was first tried with success in Florida and is now being used by the Dallas Office of Traffic Safety in the driving schools Dallas runs for motorists who have a citation and want to remove the citation from their records by attending the school.

With the use of transactional analysis, motorists can discover the type of approach they take to their driving. This approach may always be from the viewpoint of the child or the parent or the adult, but usually it varies according to the situation.

If the driver takes the viewpoint of the *child* he is liable to be uninhibited and unaware of how his actions can affect others.

The *parental* attitude also can be dangerous, for with this approach people believe they can handle any situation. They just don't believe that anything can go wrong. As a result, they may exceed the speed limit because they are convinced they are always in control.

With the *adult* approach to driving, the driver realizes his own responsibility is the key to accident-free driving.

The class begins with a film on transactional analysis. Then the class members discuss the psychological theory.

continued on page 28

Smaller autos will not have the hauling capacity of the full-sized models. Never mismatch by putting too large a trailer on too small a car; if you do you might be in the market for a new car.

If you like traveling, RVing may be for you – particularly if you like to travel without the necessity of sticking to areas where you're sure to find a motel.

Those who do extensive traveling by car have at one time or another run into the dreaded "No Vacancy" sign at motel after motel. And usually when they were too tired to drive another two miles. RVing could eliminate that headache because you have your sleeping quarters, and your dining facilities, right there with you.

Whatever your reason – a desire for comfort on the road or the avoidance of greasy-spoon diners – maybe a recreational vehicle is the thing.

Types And sizes: So where to start? Let's break the subject down into specifics. First, there are trailers. These have four basic classes, designated by their weight. Class 1 takes in those trailers up to 2000 pounds. Class 2 is up to 3500 pounds; Class 3 goes up to 6000 pounds; and Class 4 is up to 10,000 pounds.

Beyond the trailers, there are vans, motorhomes, mini-motorhomes, and pickups with campers.

Motorhomes, mini-motorhomes and vans are the all-in-one vehicles – the living area is not detachable and can be reached from the cab. Motorhomes look a little like a bus with fewer windows. They are available in different sizes, with the larger and more luxurious ones being the most expensive. They commonly run from about 20 to around 30 feet in length.

Mini-motorhomes are just what the name implies. They're smaller. But they may be just as luxurious as their larger brothers. They resemble a pickup with a custom camper *built* on the truck bed, or a van with an especially large living area. Actually, mini-motorhomes are built on special van chassis, so they're the bridge over the gap between vans and motorhomes.

And you all know what vans, trailers and campers look like. If you don't, you've just returned from 20 years in Antarctica, and you don't need an RV.

Those of you interested in buying an RV should take a trip to the local newsstand. There are excellent buyers' guides on sale that can be a great help in showing you what's available and at what prices. The guide we picked up is Woodall's, and there are others. You'll also find publications listing the thousands of campgrounds around the country you can use to park your RV during your travels. These are valuable items to put on your list to take along.

We want to give you a few facts that will enable you to get on the road with your RV and make the trip more enjoyable.

First, evaluate what your needs are.

Space, the final frontier: How many will go in the RV?, Will there be just you and the wife, or will you take the kids and Atlas, the Great Dane, and Mehitabel, the cat? The larger the population, the more room you'll want and need.

How far will you go? Are you going for weekend jaunts to the mountains for a little fishing, or will you take a grand tour of the country from Seattle to Miami? If you go a long way you may want more space for more supplies, or just to keep your distance from the kids and therefore hold onto your sanity.

The kind of RV, its size and the features it contains will depend on your budget, of course, as well as the space requirements. Do a lot of advance study and shopping around before you finally purchase.

We'll deal mostly with trailers, since these require the most advance preparation, especially if you're new to the RVing game.

Lighter trailers, those under 2000 pounds, will require simple weight-carrying hitches, with the hitch bolted to the frame of the tow vehicle. Heavier trailers need a weight-distributing or load-equalizing hitch. These have bars that are bolted onto the tow vehicle's frame at several places. They do just what it sounds like – they distribute the load over all the axles, those on the trailer and those on the tow vehicle.

And now that we've mentioned tow vehicles, let's deal with their needs.

continued

This is a fifth-wheel trailer, so called for the special hitch it employs. The overhanging part of the trailer attached to the bed of a pickup by means of a hitch like those used on semi trucks; therefore the "fifth wheel." The extension on the side is a "tip out" room, an option available on some trailers.

The trailer you want may be too heavy for your car, and you'll need to either buy a new car (or truck) capable of pulling it, or have your present vehicle altered to do the job. Remember that some autos are just not made for pulling anything heavier than Class 1 trailers, and you can't alter them to serve.

But we'll suppose, for argument's sake, that you have a suitable vehicle for the mechanical work, or else you want to purchase a workhorse to pull that shiny new trailer.

There may be other things needed on the car or truck besides the tow bar and hitch to make it an acceptable tow vehicle. Here are some of the possible necessities; check with the manufacturers of the trailer or the tow vehicle to see what may be needed:

Heavy-duty shock absorbers and springs for a stronger suspension.

Heavy-duty battery and alternator.

Heavy-duty radiator, a fan with more blades and a coolant overflow container.

Transmission oil cooler.

Heavier axle designed for towing.

Heavier ply tires and wider rims.

Heavy-duty brakes on all wheels.

Special wiring to the trailer by means of a single connector plug to power the lights and brakes.

Large extension mirrors for both sides of the tow vehicle.

Load balancing: So now you've got a horse big enough to pull your wagon, just hitch up and go, right? Wrong. If you don't balance the weight you're asking for difficulties and your wish will be granted. Imagine driving in your car with yourself and your four-year-old in the front seat, and two 300-pounders in the back seat. Get the idea?

A well-balanced load will make for a better handling vehicle. Balance is determined by the tongue load – the amount of the trailer's weight that is at the coupler.

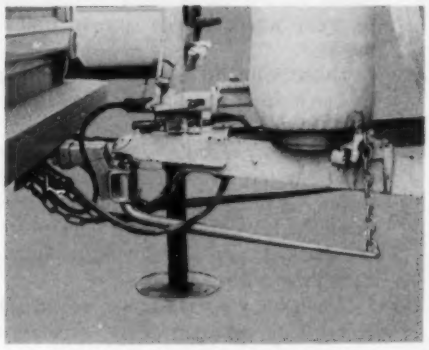
The tongue load on Class 1 trailers can be no more than 200 pounds. The tongue load for all heavier trailers will be 10 to 15 percent of the Gross Trailer Weight. Again, this will require the weight-distributing or load-equalizing hitch.

To figure what the tongue load should be, first take your tow vehicle and trailer to a vehicle scale. These can be found at some truck stops, or check the phone book yellow pages under "Weighers, Public."

Just because it's called a mini-motorhome doesn't mean it's either small or spartan. Some can cost $20,000 and more.

First, weigh the entire assembly – trailer and tow vehicle. These should be fully loaded with all the equipment and articles they'll be hauling, including passengers. Next, weigh the tow vehicle alone. Subtract, and this will be the Gross Trailer Weight (GTW). Take 10 percent of the GTW as the minimum tongue load and 15 percent as the maximum.

Then maneuver the trailer so that the tongue only is on the scales. Adjust the jack so that the coupler is at the proper height for the tow vehicle's hitch ball. If the load is too heavy, shift some of the load in the trailer toward the rear until it becomes light enough. If the tongue load is too light, move some of the trailer's contents toward the front. The manufacturer will set maximum loads that the trailer (or any kind of RV) can haul; be aware of these.



This is a load-equalizing or weight-distributing hitch. The spring bars, those with the chains at one end, are adjusted to distribute the tongue load to all axles of the tow vehicle and the trailer.

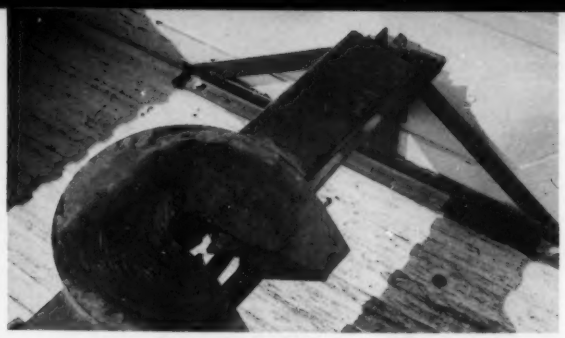
On the trailer trail: Now that you've made the necessary preparations before you go out on the road, it's time to think about the road itself, and how to drive with a trailer in tow.

You must use caution whenever you tow. That equals calmness, coolness, and slowness. Don't try driving with a trailer at high speeds. It isn't too bright and it isn't safe. If you're in a big hurry, take a plane.

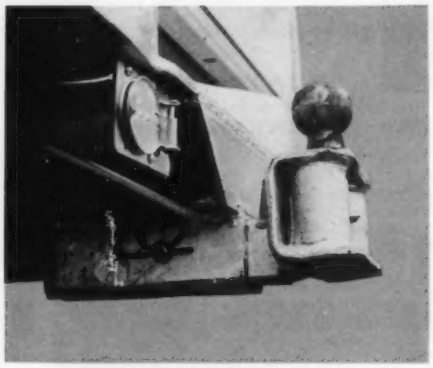
When you accelerate, do so gradually and smoothly. We told you about all those extras to have installed on your vehicle because of the added stress placed on it by hauling a trailer. Rapid acceleration puts more stress on the vehicle's engine, and its frame, and it won't like that. It'll tell you how much it doesn't like it by overheating.

And now for a word for your friend, the brake. When towing a trailer, braking will put an added strain on your tow vehicle's brakes, even with the assistance of the trailer's brakes. Don't apply the brakes for long, continuous periods. They won't like that and they'll tell you now much they don't like it by overheating. Pump the brakes instead.

Since braking requires so much more care when you're towing, give yourself the time and space to slow when you have to. The recommended following distance in your car is one car length for every 10 miles per hour. The same goes for the RVer – but then



Here's a look at the fifth wheel hitch bolted into the bed of a pickup. It looks much like the hitch on a semi.



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Oh yeah. And keep the speed down.

Traveling on uneven terrain also requires more caution. Again, the problems are the possibility of overheating the engine or the brakes. To avoid this, you can use the car's transmission. When you're traveling downhill, shift to a lower gear to assist the brakes. Pump the car and trailer brakes now and then to keep your speed down.

When you go uphill you may need to shift down, too. An overheated engine could be the price you pay for pushing it too hard.

If the engine should overheat while you're going uphill, or anytime for that matter, you'll have to cool it off as quickly as you can. Stop and put the transmission in park or neutral, but leave the engine running. Rev it to a fast idle and keep it there until the engine cools. Whatever you do, don't take off the radiator cap or you'll have hot coolant sprayed all over you, which is unpleasant at best.

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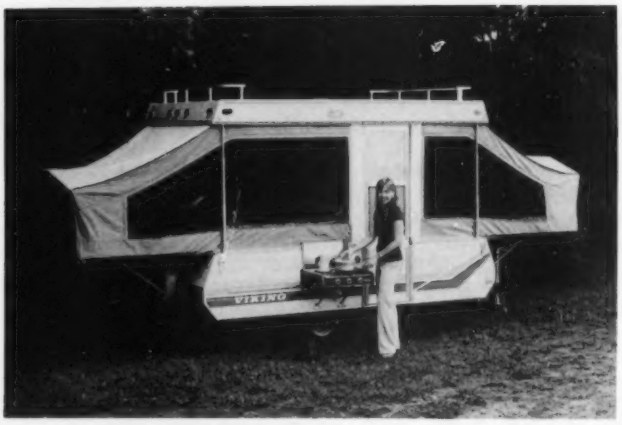

Fold-down trailers like this one can provide comfortable and spacious living quarters for several people. They are fairly lightweight and can be set up in only a few minutes. On this one, the propane gas stove can be set up outside so you can cook out-of-doors. And they fold up (below) to a compact size for easy transportation to and from the camping sites.

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Backing a trailer is anything but easy, but it can be learned with a little practice. Put your hand on the lower part of the steering wheel. To move the trailer to the right, move your hand to the right, and to move the trailer to the left, move your hand to the left.

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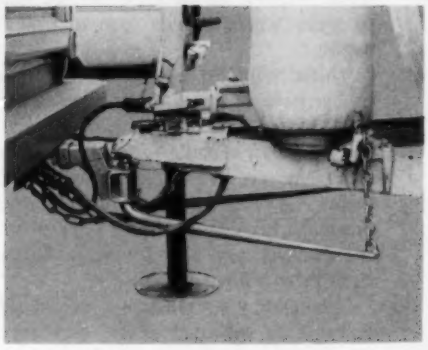

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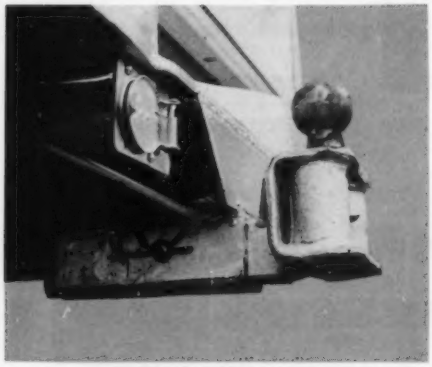

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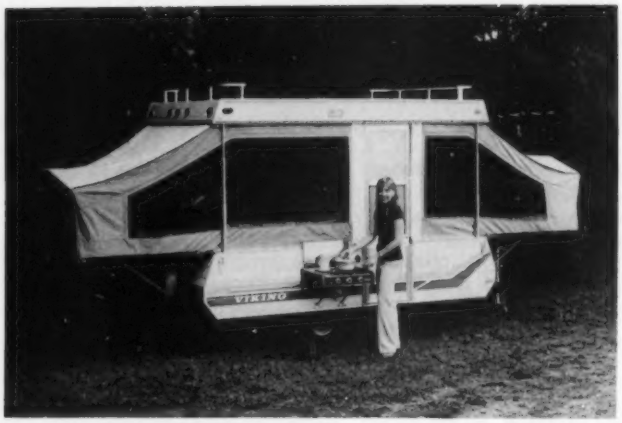

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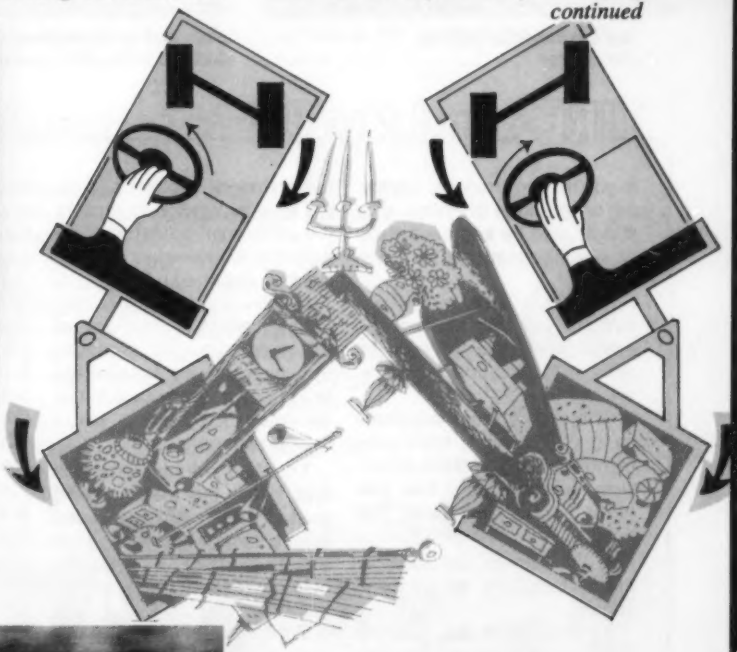

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There are thousands of campgrounds for recreational vehicles across the country. You can purchase a campground guide at a newsstand that will enable you to stay away from towns, if that's what you'd like.

An old familiar favorite, the camper.

Full-size motorhomes are the most expensive vehicles on the road. They can cost from around $15,000 to $40,000 or more.

TIRES and the RV

If you're into trucking, camping or any type of RVing, you should also be into the basics of tire applications for your vehicle.

Knowing and following through with the correct application of tires is basic to vehicle safety and performance.

One of the most important factors affecting a tire's performance is inflation pressure. To understand this, you must first understand the basics:

1. Air carries the load. A tire is basically an air container.

2. The larger the quantity or pressure of air contained by a tire, the more load the tire can support.

3. Tire load-carrying capacity can be increased by increasing the air pressure (which might require changing to a higher load range in the same size) or by providing a greater volume of air (changing to a larger size tire).

4. The load range letter (or ply rating) is an index of the maximum cold pressure for which a particular size tire is rated. It determines the maximum load that a given tire can support.

The two principal factors that affect the load-carrying capacity of a tire increases with a larger tire size, even though the load range and inflation pressure may remain the same.

When switching to a tire with a higher load range, higher inflation pressure may be used, up to the tire's specified limits. This again adds to the tire's load-carrying capacity. A higher load range does not provide additional load-carrying capacity unless the air pressure is increased.

The load range inflation limits of light truck and recreational vehicle tires are not the same as passenger tires. They also may vary between sizes and construction types. Check load and inflation tables available at tire dealers for comparisons.

To obtain the best performance from any tire, the inflation pressure should be matched to the tire size and the actual load carried by the tire. The most accurate method for determining the load is to have the vehicle weighed, axle by axle, when fully loaded.

In cases where weighing the vehicle is not possible, you must estimate the load carried. Calculate the total weight of the empty vehicle, passengers, fuel, and cargo. Empty vehicle weights are shown on the vehicle registration certificate in most states. Then estimate the load each axle supports.

You may find that the vehicle is loaded beyond the suspension limits as specified on the permanent label attached to the cab. This label has been required for all motor vehicles manufactured since 1 Jan 1972. It indicates the maximum gross vehicle weight (GVW) and axle ratings for the vehicle as manufactured.

(GVW is total weight of the vehicle, including driver, passengers, fuel and cargo.)

The axle rating is limited by the weakest component of the axle system, which consists

continued

a large trailer, your entire vehicle could be three times as long as the car alone.

Advance to the rear: How about backing up that trailer? You've all seen the cartoons and commercials with someone destroying half a house by backing into it with their recreational vehicle. Some of the stories are true, so don't laugh until you've mastered the art of backing.

It's a tricky maneuver, so it's a good idea to practice in a wide-open area, like a parking lot. Put one hand on the lower portion of the steering wheel. Move your hand to the left to move the trailer to the left, and move your hand to the right to move the trailer to the right. Sounds simple, doesn't it? Well, talking about it is the only thing that *is* simple about backing. Have fun practicing.

The owner's manual you receive with your trailer should explain the proper way to back the thing. If not, Ford Motor Company publishes an excellent booklet called "Things to Know Before You Tow" which sums it up very well.

And now a word about driving in high or gusty winds: Don't. It's a lot safer to avoid them, and also avoid the possibility of the trailer overturning or jack-knifing on you. But if you're going to do it, the slower the better.

The addition of large rear-view mirrors is a must on some recreational vehicles, and on all cars or trucks that pull large trailers.

When you park the trailer, put chocks against its wheels, put on the parking brake in the car and put the car's transmission in park. Parking on an uphill or downhill slope may mean you'll take a trip during the night.

Does all this make it sound like it's complicated to go RVing? Well, it is. They say nothing worthwhile is ever easy, and a lot of people are willing to take the trouble to prepare for Rving because they think it's worthwhile.

And there's a lot more you should know that we haven't had space for. Auto and RV dealers will have booklets that will help, and don't forget that newsstand.

Before we leave, let's look in on our old friend, Fred. On his way around town looking for that fishing reel for Joey, he begins looking at fold-down tent trailers. After some intensive study and shopping he gets one with sleeping room for six, a small stove, an icebox and a sink. Fred takes Joey on fishing trips as often as he can get away, and sometimes even manages to convince his wife and a couple of neighbors to come along.

Charlie visits occasionally, but somehow his brother Fred is always out of town.

of the tires, wheels, springs and axle. If the limits are exceeded by the load carried, a tire that will handle the load can be installed, but you may be overloading other parts of the suspension system. Contact your vehicle dealer to determine the limiting components of the system. It may be the tires are the limiting component, and installing a larger size or higher load range tire will increase the permissible GVW and axle rating.

After determining the weight each axle supports, divide this amount by the number of tires on that axle. Then use a load and inflation table to determine the tire size and load range required.

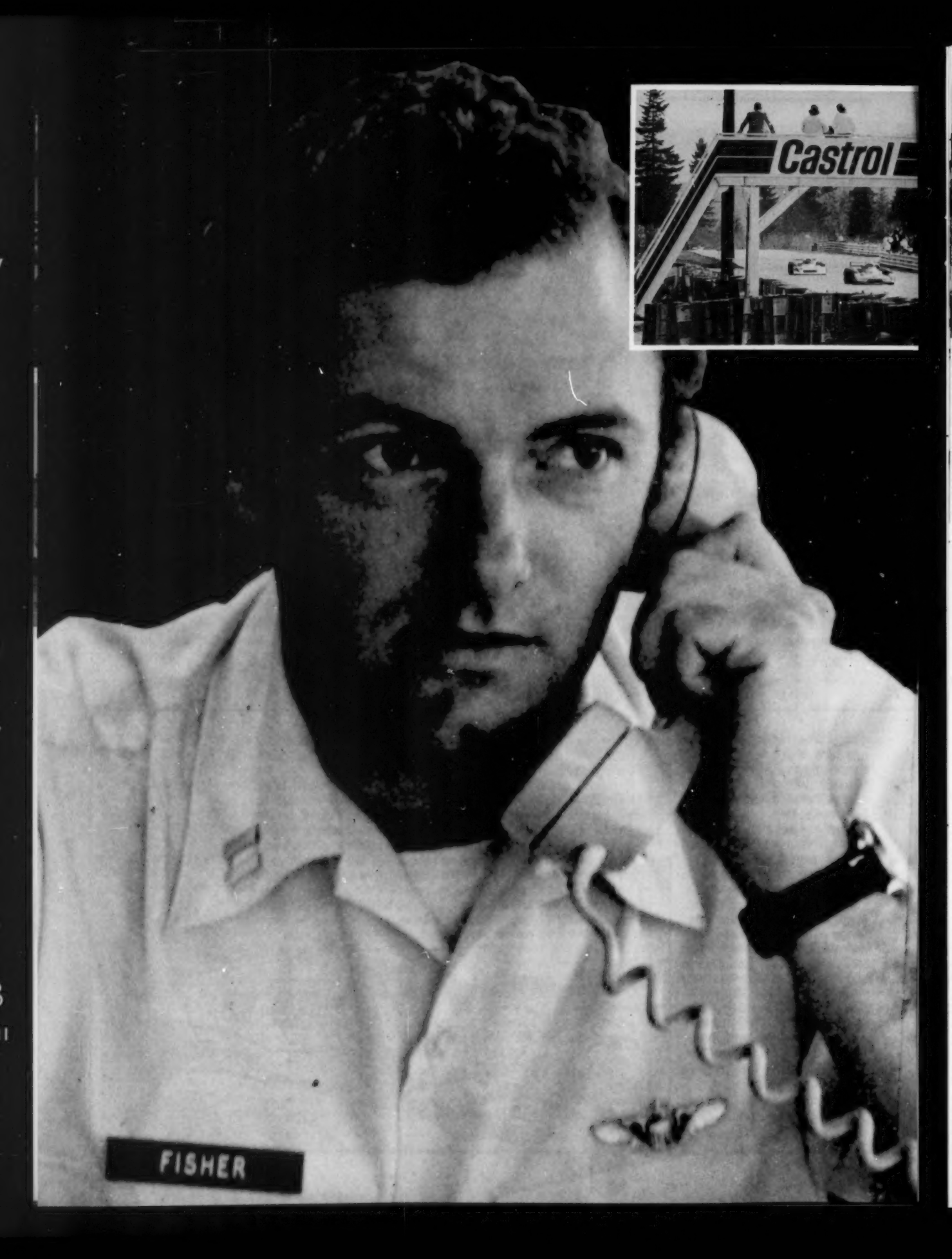
(Information from Firestone Tire and Rubber Co.)

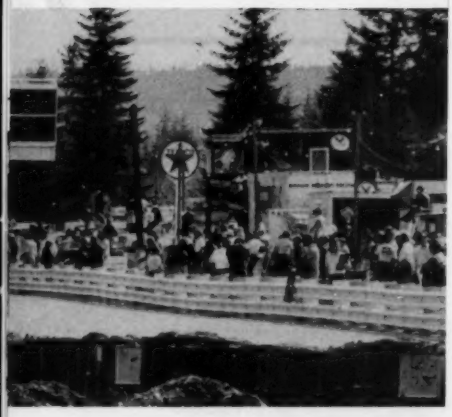
GOING, Going, going...

Here's a for-what-it's worth item: ***Automotive News*** brought up an interesting question recently—what will happen to the current RV trends when the car makers phase out their larger engines? As the engines of cars and trucks are downsized, their ability to pull trailers will be decreased, because a small engine cannot stand the strain of pulling a heavy trailer. The cars of the 1980s may not be able to pull the largest trailers that are now available.

What will this mean later on? Will people be forced to go for smaller trailers, or will they go more toward the mini-motorhomes? Or will they just hold onto their present gas-guzzling 460-cubic-inch autos?

Stay tuned; it may get interesting.


Castrol
FISHER



PART II

Whether Flying or Racing, this Chief of Safety Goes... at the LIMIT

Last month, we covered the Westwood, British Columbia, Formula Atlantic race in which our intrepid Chief of Safety, Capt Mike Fisher, was shown going 160 mph down the race course's back straight in a car that travels about two inches off the ground. We told you then that we'd have an interview with Mike and that we thought you'd find his comments about racing, flying, and the job of Chief of Safety quite interesting. We begin that interview as Mike confers with Ralph Young, his crew chief, about some changes to be made to the Formula Atlantic March 78B car because of the impending rain on the race course.

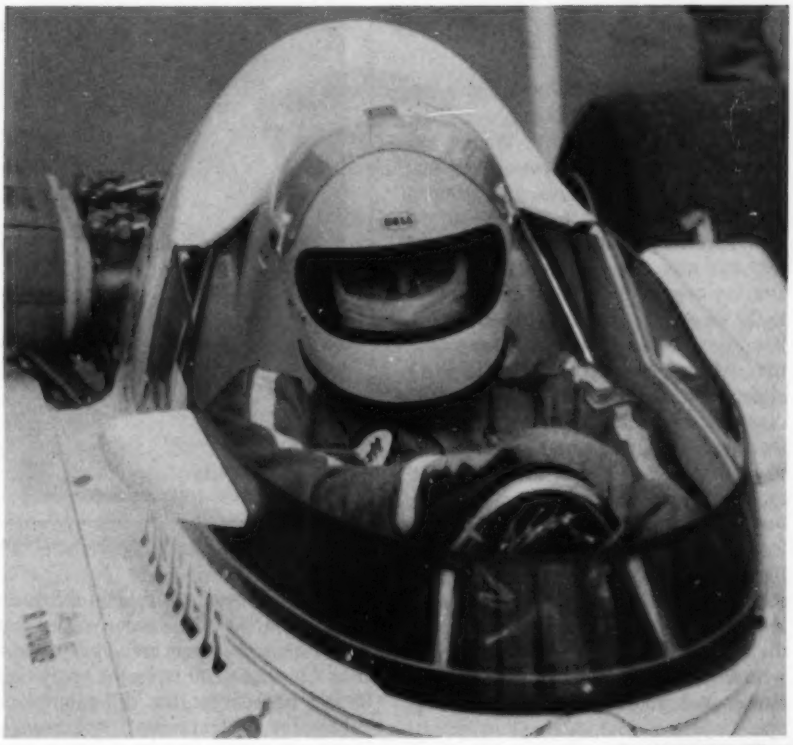


Photo by Richard Scott

FISHER: . . . and change the brake bias to 3 front, 5 rear. Let's put the shocks to full soft on rebound and damping front and rear, and go full soft on the sway bars . . . and while we're at it, do you think we should change the angle of the rear wing? What do you want to do about the front wheel lip spoilers?

DRIVER: I can see you're pretty busy. Do you want me to come back a little later?

FISHER: No, that's OK. It may look like confusion, but the decisions are pretty straightforward and my crew knows exactly what to do. We were ready to run in the rain, so it just involves a few changes to the chassis and suspension, the wings, and a change to rain tires . . . it rains so much here that they're going to change the name of the track from Westwood to Wetwood.

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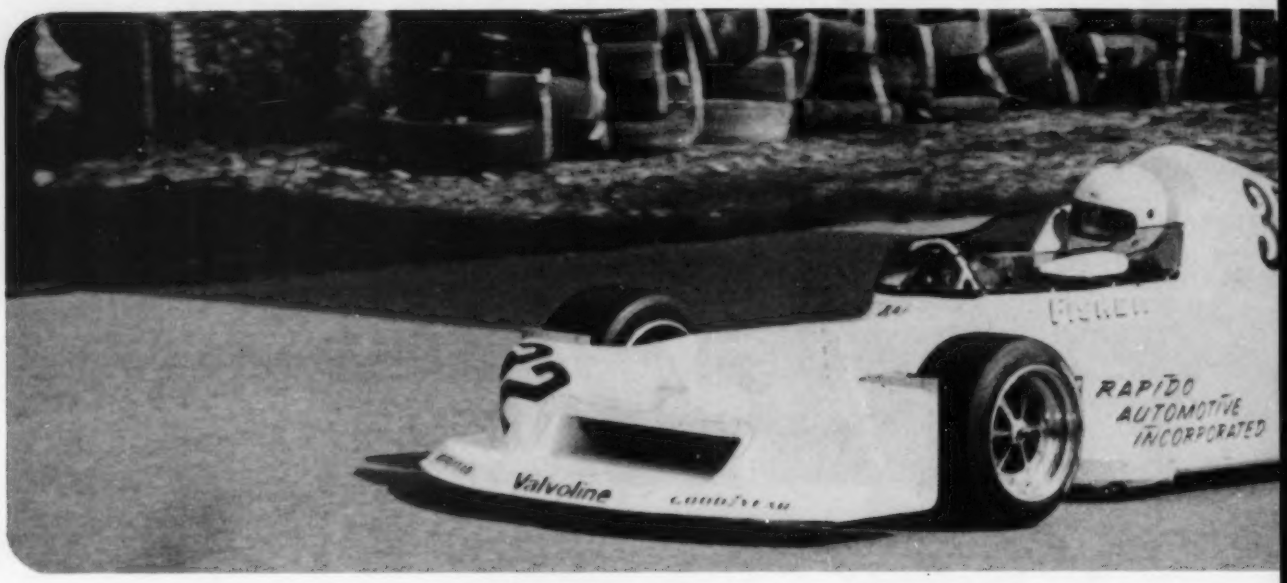


DRIVER: How much difference will the rain make in your race plan?

FISHER: Not much really. Except for the fact that I get a bit wet around the edges during the race, it's pretty much the same. The rain tires we use allow us to almost maintain our regular speeds without any trace of hydroplaning. Our lap times will drop off from seven to 20 seconds, depending on how hard it rains. As you heard, we change all the suspension settings to full soft, change the angle of the wing for more downforce, and change the brake bias so that there's more braking from the rear tires than from the front. As far as the driving is concerned, I have to begin braking earlier because of the loss in traction, and I have to be sure I use an anti-fog compound on my face mask, but that's about it. The situation is almost the same as street driving in the rain. You do the same things as you would normally do; your speed is slower and your caution level is way up.

There are a few dangers that are amplified on a race track though. If you've ever driven on a freeway in the rain, you know that other cars throw up roostertails of water and cause a large amount of spray from the front,

Photo by Richard Scott

and both of these can do bad things to your vision. On the street, you've got to be sure your wipers are in good shape at all times. At 160 mph, the spray factor is a little larger, but still as critical.

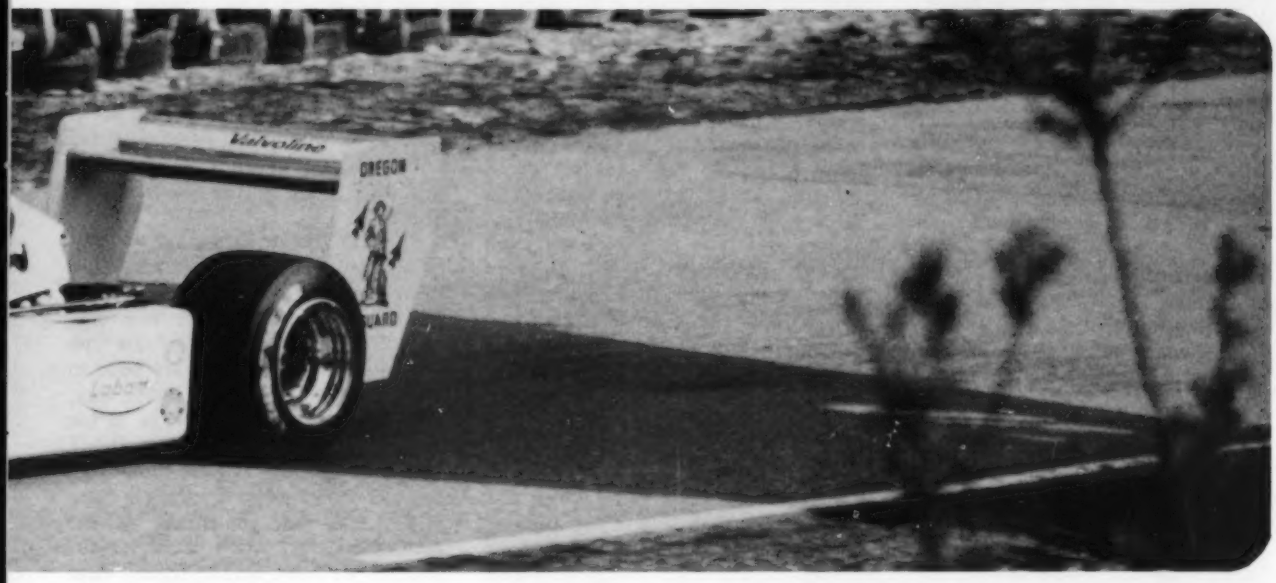
Puddles and standing water in a street situation are pretty bad, but they're even more crucial in a racing situation. So, I just do like I do on the street . . . I stay away from them.

One very real difference between racing in the rain and street driving in the rain is tires. If you look at our rain tires, you can see that there isn't much of an area for water to get trapped and contribute to hydroplaning. Street tires are pretty good today, but they still allow you to hydroplane if your speed is too fast or if the tire pressure isn't right. My rain tires are soft, gummy rubber, while street tires are hard so they'll wear better. Take a tip from race drivers and don't attempt to drive in the rain at normal speeds . . . your tires just aren't up to the task.

Also, being a race driver gets you used to spins, something a newer street driver might not experience until he's actually *in* one. I've found that racing can be a good basis for street driving safety.

DRIVER: Can you tell us a little more about how racing relates to street driving?

FISHER: Sure. Most, if not all, of the techniques we use in racing can be applied to street driving. Things occur in racing that are identical to normal driving . . . for instance, pedestrians. You might not think there would be pedestrians on a race course, but until you've seen some turkey cross from the gallery to the pits during a race, and you're bearing down on him at



160, you don't know the meaning of the words "oh-oh." We get wrong-way traffic when a car spins in front of us, we get failure-to-yield when a car shoots out of the pits onto the course without looking, we see 'speed too fast for conditions' when a guy goes all out during a yellow flag condition . . . we see it all. Again, the techniques we use to avoid these and other hazards on the track are the same as are used on the street, except they're more intense. Skids happen faster at 100 mph; competitive spirit, which as you're well aware tends to run high on freeways at rush hour, is ever-present in racing . . . we have almost any situation that you can think of.

One other thing that racing will teach you is the limitations of your car. If you race, you will generally have a car that is prepped and "sorted" to the limits, which isn't exactly true with a street car. Shocks, springs, sway bars, alignment settings, and steering ratios on a passenger car are all set up for creature comfort, not for handling and stopping ability. You may think your little British sports car is a pretty good handling automobile, and it might be in relation to the iron Detroit generally puts out, but even your sports car is pretty far removed from truly good, balanced handling and performance.

There's also something else I'd like to comment about . . . aggressiveness. You've got to remember that in order to win in racing, as well as in almost all other endeavors, you've got to be aggressive to get ahead and stay ahead. Yet, in all the safety material about driving we see the phrase "defensive driving." Well, I'm all for that . . . defensive driving can often make the difference between having or not having an accident. But I do think that there's room for a little aggressiveness, too. If you look at the average elderly driver, well, he's pretty much of a defensive driver . . . maybe a little too defensive. I have a feeling that perhaps sometimes defensive driving tends to be overemphasized . . . there is room for, and at times a definite need for, aggressiveness. You have to use good judgment, but of course that's required at all times, so if you have it, why not use it?

Anticipation is another factor that crops up when you talk about racing techniques that are applicable to street use. In racing, you *have* to anticipate everything. Things happen so fast that if you haven't thought out your reaction beforehand, you're gonna be off in the weeds. When you race, you have to brake BEFORE a corner, downshift BEFORE a corner, even set a car up in a slide that you use to exit the corner BEFORE you enter the corner. You must plan on where you can go for an escape route on each and every portion of the track before you begin to race. In street driving, you have to anticipate what that child playing in the street ahead of you will do . . . will that turkey at the curb dart across . . . will that armored car pull out in front of you? You *must* anticipate, or you'll be in trouble because you're not ready for anything.

If you anticipate, you'll be prepared for whatever happens, and that'll give you the benefit of a little extra time . . . time you wouldn't have if you weren't ready. It's a bit like flying.

As an IP (Instructor Pilot) I tell my students "unless it's an emergency on takeoff or landing, take a second and analyze your situation." Well, you don't *have* that extra time to think and analyze your situation if you don't anticipate the situation.

DRIVER: Tell us more about the analogy between racing and flying.

continued

FISHER: Well, I feel that racing is more dangerous than flying, but there are a lot of valid comparisons here, too. I think the danger is greater in racing because of the relative speed at which you travel, and the immediacy of the consequences of an error or mechanical failure. In a race car, if something goes wrong or if you make an error, it happens *right now*. In an aircraft, unless you lose an engine on takeoff or blow all the tires on landing, you have time to consider the problems and analyze your alternatives. Remember, even though an aircraft may be going at 700 knots, unless you're flying formation you're at least a thousand feet apart. In racing, you're inches apart at 150 mph. The consequences of a mistake come sooner . . . they're more graphic, pronounced . . . almost instantaneous.

Racing and flying are alike in the degree of concentration required to do either one well. Driving flat out for an hour, a dogfight at 20,000 feet for 12 minutes, and a two-hour final exam all have the same thing in common . . . at the end, you're exhausted even though, physically, you didn't accomplish that much. The concentration is what tires you. I would liken it to a normal drive on the freeway that turns into a nightmare because of something out of the ordinary, like heavy rain, snow, or blowing dust. You really have to concentrate to arrive safely, and when you get out of the car, you're like a dishrag. If you want to know what racing or flying can be like, try concentrating on just *one* thing for a solid hour without allowing yourself to be distracted in the least . . . if you *can* do it, you'll find yourself exhausted.

I'd also like to bring up another point that flying, racing, and even street driving all have in common . . . maintenance. Maintenance is everything. You see, racing cars are just like aircraft, in that they are built to withstand high stress. But racing cars, unlike aircraft, are built to go at the limit *all* the time, while an aircraft will have the *capability* to go the limit, but doesn't. You rebuild a race car completely after (and sometimes, during) each season. We don't overstress aircraft, so we don't have to rebuild them all the time. But part of that is the fact that aircraft *and* race cars get proper preventive maintenance.

I consider the crew I have to be about the best around, both my car crew *and* my Guard Aircraft Maintenance Crew. My car guys, Ralph Young and Gregg Lapinski, know the business of car preparation to the Nth degree and I can go out on the track knowing that my car is as ready and as safe

Photo by Richard Scott

as it can be. The same thing goes for the maintenance (and ops) people in my Guard outfit, the 142nd Fighter Interceptor Group. I'd like to get on my soapbox for a minute and say that our maintenance people are the best around, and that is no bull! I speak not only as a Chief of Safety, but as a pilot of their aircraft and a guy who's taken the maintenance officer long course . . . just look at how many times the Guard's won the William Tell competition. We've got guys like CMSgt Dick Rosenthal . . . he's been the munitions guy in our outfit for over 15 years, and you can believe that when he talks the rest of us will listen because with his experience, he knows whereof he speaks.

Going back to actual maintenance for a minute, consider that we spend 100 hours of maintenance for every one hour of racing time. For aircraft, since they're built for stress but not generally flown at max, we spend about 30 hours on maintenance for every flying hour with our F101s and about 40:1 for the F106. Now, your passenger car gets about one hour of maintenance for every who-knows-how-many hours of driving . . . which do you think will be the safer machine? I'm a firm believer in PM and I think that most of us would do well to pay a bit more attention to our everyday-type transportation. Proper maintenance will save your tail many, many times, but like a safety briefing, if it works right, you won't have any statistics to show because nobody hurt themselves . . . but without it, look out.

DRIVER: As well as being a first-line pilot and an instructor pilot, you're also Chief of Safety for the 142nd. How do you view the role of Chief of Safety?

FISHER: Well, the job description in the 127-1 takes up two pages, but if I had to boil it down to one thought, I'd say the job of a Chief of Safety is to eliminate complacency. If you can do that, you'll have a safety program.

I rely heavily on my experienced supervisors to get the safety message across, but I don't feel the entire safety program rests with them. Somewhere along the line there's got to be individual responsibility . . . each person is ultimately in charge of what happens to him or her. Yes, supervisors *are* invaluable in explaining to the newer people how to be safe, and more importantly, *why* to be safe, but the final decision still rests with the individual.

It sometimes seems that a lot of supervisors today are so burdened with paperwork that they rarely ever get to do what they were hired to do . . . supervise. The supervisor has got to establish a good rapport with his or her people. This "me sergeant, you airman" junk just doesn't cut it. If a shop chief works *with* the people instead of against them, explains the "why" of safety as well as the "how," you're going to have a safe environment and good shop output.

I also think that perhaps Commanders could spend a little time in the field with the troops. If a person sits all day long in the actuator shop, just rebuilding actuator after actuator, he begins to lose sight of how he relates to the whole set-up. If the commander comes along and says "You know, I was thinking that if one of your actuators failed on me while I was 200 miles out over the ocean, I'd be in deep trouble . . . the job you do is important, and I'd like to thank you for doing it so well." That kind of thing, along with letting people attend unclassified mission briefings, will really show a person where they fit in and exactly what their contribution to the mission is . . . it'll go a long way toward a safe and happy outfit.

ATTENTION

BACKYARD MECHANICS

When we first gave you the instructions on what envelopes and postage to send for the "Backyard Mechanic" Volume II, we thought we had made things clear. Evidently we were wrong. We said to send a 9½" by 12" envelope, self-addressed, with 50 cents postage affixed. We have received any number of envelopes with 13 cents postage, 15 cents, and on up. We have received envelopes large enough to mail you half the state of Rhode Island, and some barely large enough to put a post card inside.

We'll try again. If you'd like to receive your copy of BYM Vol. II right away, send us a self-addressed, stamped envelope. If you can wait until your friendly DRIVER people will send it at AF expense, send us your name, rank and address on a postcard.

But PLEASE, if you're sending an envelope, send the right one. If a copy of DRIVER will fit in the envelope, that's the right size. Put 66 cents postage on it – remember, there's been a postal rate increase. If you send a larger envelope, the Postal Service will collect additional postage from you. If you send us insufficient postage, your request will go into the bin with the people who are willing to *wait* for BYM.

Other things to remember:

1. Give us your rank, BYM will be mailed only to active duty military. If you're not active duty military, send a check for $1.60 to the Consumer Information Center, Pueblo, CO 81009 for BYM Vol. II. They also sell Volume I for $1.25.

2. We are out of Volume I. Sorry about that.

3. Make sure your name and address are legible. We don't wanta go blind.

4. If you ask for one copy of Volume II, you'll get one copy. If you ask for four copies, you'll get one copy. Them's the rules.

5. Address the envelope to yourself. Also, put *your* address in the upper left-hand corner. There has to be something in that corner and it may as well be your address as anything else.

6. Don't send cash, checks, or any of the negotiable stuff. Just the stamped envelope.

7. If you're Air Force, Army, or Coast Guard, send requests to:

The Backyard Mechanic
Norton AFB, CA 92409

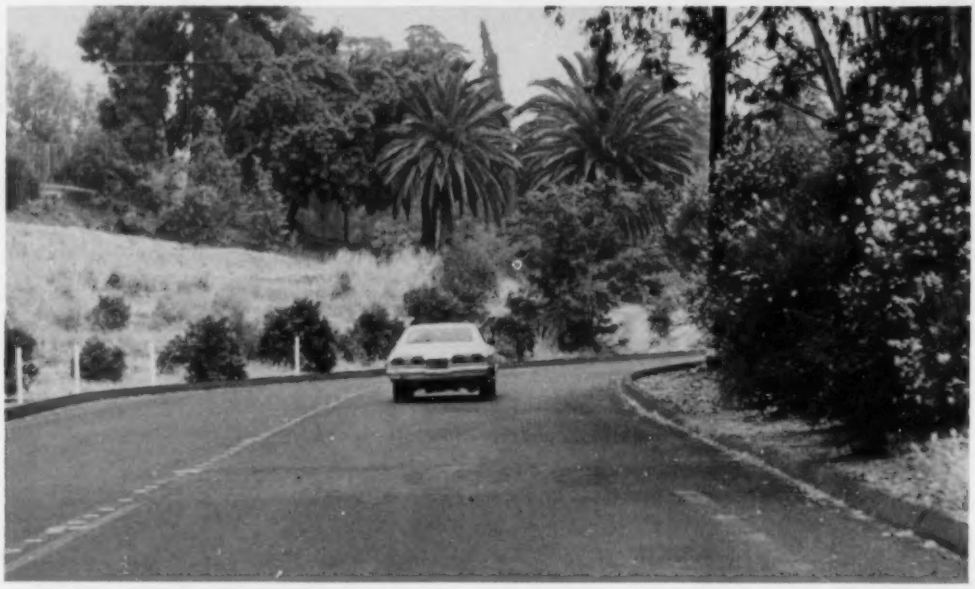
8. If you're Navy or Marine, send requests to:

The Backyard Mechanic
NAVSAFECEN
NAS, Norfolk, VA 23511

Rad
Lo

1 (near right)
Here you are, driving along a road in a quiet residential district.

2 (far right)
It's a nice day and the breeze is blowing and the road has some nice curves, and you decide to increase the velocity of your automobile or, more commonly, speed.



3 (near right)
Hey, you don't fool around with just a few miles an hour when you speed, do you? Rolling along at 15 miles above the posted limit; gee, what fun!

4 (far right)
You're really enjoying this, aren't you? Does the fact that there's a reason for the speed limit worry you at all?

5 (near right)
Hey, that up ahead. That's not . . . is it . . .?

6 (far right)
Yep, it is. And it's too late to slow down. He's already nailed you with his trusty radar gun. Hit the brakes and pull over.

continued

lar
ove

radar love

continued

7 (near right)
Great! Just what you needed to ruin an otherwise nice day!

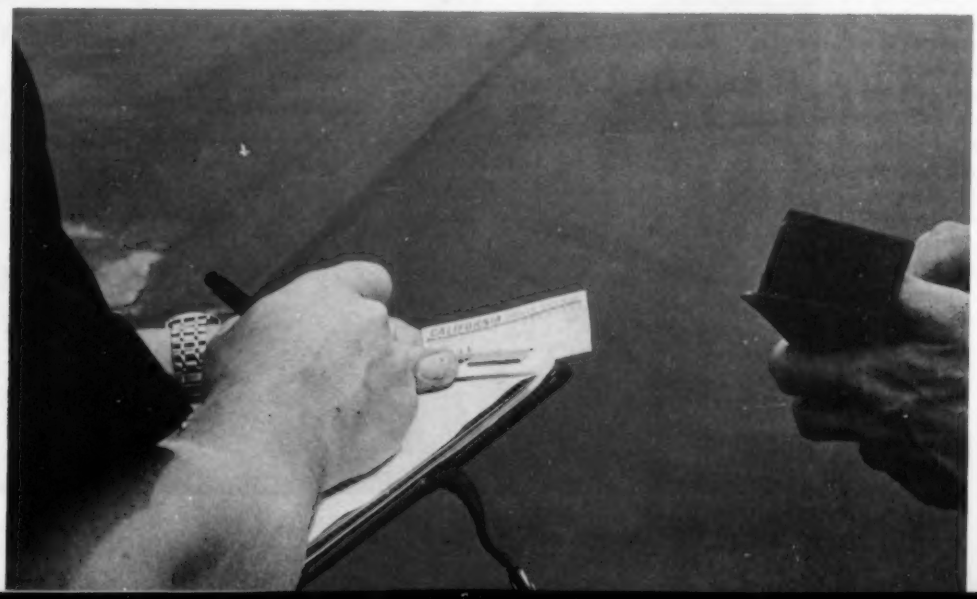
8 (far right)
You're thinking things like "Curse you, Darth Radar!" as you stop and kill the engine. But you realize that's a little silly. He's just a police officer and you're just a minor, garden-variety lawbreaker, a speeder.

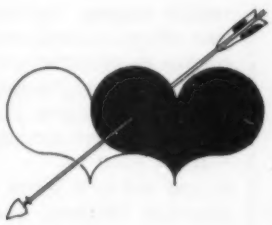
9 (near right)
Your're annoyed with yourself, aren't you? Just make sure you don't transfer that annoyance to the police officer. He's just enforcing the speed laws. Exactly what he's been hired to do.

10 (far right)
Here he comes. Get the license out and wait. You think "He's not gonna say 'Okay, where's the fire?' is he?"

11 (near right)
No, turns out he's quite polite. Says, "Afternoon, sir. You were going 40 in a 25-mile zone." No lectures. He lets you think on your own about the accidents you might have caused.

12 (far right)
He gives you your ticket, wishes you a good day and goes back to his car. You give *yourself* a silent lecture: "This little excursion into the realm of Grand Prix racing will cost you some points on your license, and maybe higher insurance premiums next time they're due. Congratulations!"





DRIVER wishes to thank the Police Department of Redlands, California, for their assistance in the preparation of this photo feature.

PRE DEPLOYMENT AUTO CHECKLIST

Fruit salad is fine, but
don't leave your honey a lemon

by AME1 Michael H. Yates, USN
AIRANTISUBRON THIRTY-EIGHT

Let's face it . . . TDY and TAD are a fact of life in the military. Some trips aren't too bad, like three weeks in Hawaii, but all the trips have one thing in common . . . you have to leave your vehicle at home. For single people, that's not much of a problem. But for married folks, that means that the spouse will be responsible for the operation of the vehicle.

How can you be sure that the vehicle you leave will not cause the "leavee" any problems? Well, you can't be absolutely sure, but there are certain steps you can take that will minimize potential problems and let you go about your away-from-home duties with one thing less on your mind.

Problems with leaving a vehicle in the hands of non-mechanically inclined spouses are more predominant in the Navy, where separations are likely to be of longer duration than most Army and Air Force temporary situations. With this fact in mind, AME1 Mike Yates of AIRANTISUBRON THIRTY-EIGHT, along with members of the squadron safety shop, came up with a pre-deployment vehicle checklist. This list, if followed, will vastly increase the chances of your vehicle staying "operational" during your absence. And you don't have to confine its use strictly to a pre-deployment situation. How about prior to the next permanent change-of-station move, or before the big vacation trip?

It's a good list . . . use it, follow it, and add to it where your particular situation dictates, and you'll have peace of mind and a happy spouse.

CHECK OPERATION OF:

- Headlights . . . high and low beams
- Parking lights . . . front and rear, both sides
- Turn signals . . . front and rear, both sides
- Brake lights
- Back-up lights
- Emergency flashers
- Dome and interior door lights, trunk, glovebox and underhood lights
- Power steering, brakes, and air conditioning
- Horn
- Windshield wipers and washer system
- Gauges, warning lights, indicators

CHECK CONDITION OF:

- Radiator and heater hoses
- Engine vacuum lines
- Fuel lines
- Brake lines
- Brake linings, discs, pads
- Engine drive belts (fan, alternator, etc.)
- Air filter
- Battery cables
- Shock absorbers
- Tires
- Seat belts
- Windshield wipers and washer system

CHECK LEVEL OF:

- Radiator
- Expansion tank
- Master cylinder(s)
- Battery fluid
- Windshield washer fluid
- Engine oil
- Transmission fluid
- Rear-end lubricant
- Power steering pump reservoir

CHECK TIRE PRESSURE

BE SURE SPOUSE KNOWS:

- Location of spare bulbs and fuses
- How to change bulbs and fuses (fuse removing tool)
- How to check oil and other fluid levels
- Normal levels of oil and other fluids
- How to check tire pressure and/or change to spare tire
- When to have car serviced:
  - A. Oil change
  - B. Filter change
  - C. Lubrication
  - D. Tire rotation
- Location of spare keys
- Location of papers (registration, title, proof of insurance)
- Name, phone number, and location of insurance agent
- Name of a reliable auto repair facility and/or towing service
- Details about the specific automobile like:
  engine size
  carburetor make and model
  tire size
  car make and model
  horsepower rating
  type body
  type transmission
  number of cylinders
  with or without: air conditioning, power steering, power brakes
  type of windshield motor, vacuum or electric

BEFORE DEPARTURE, BE SURE TO:

- Get the car greased, and the oil and filter changed
- Get the car tuned up
- Get the front end aligned
- Do all the checks listed above!

HOW IT HAPPENS

A1C Jack Hill and his wife Jill are returning home to the base from a local pizza parlor at which they consumed two giant-size combinations and three pitchers of Coca-Cola. Traveling down a 35 mph road at about 32, their car is struck by a van going in the opposite direction that has crossed the center line. A1C Hill and his wife are thrown from their auto and killed instantly. The occupants of the van are treated at the hospital and the driver is booked by the police for drunk driving.

The solution to this one is simple, and obvious – the Hills weren't wearing their seatbelts. How many times do you get in the car without buckling up? Without that belt, you could be doing everything right, driving slowly and carefully, and you might still have to pay the price.

Maybe the belts wouldn't have saved the Hills. Then again, maybe they would have.

update ON ELECTRONIC IGNITION SYSTEMS

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Electronic ignition systems (EIS) and conventional breaker-type systems differ in the manner in which they control the primary voltage circuit. Operation of the secondary voltage circuit, however, remains the same in both systems . . . they still rely on a conventional induction coil to produce the high voltage necessary to fire the spark plugs. Procedures for testing and servicing the secondary circuit are, therefore, basically the same for both EIS and conventional systems.

The primary circuits in original-equipment electronic ignition are controlled by solid-state modules and by switching devices inside the distributor. The switching devices generally consist of a stationary electromagnetic pickup coil and a rotating trigger wheel. They generate a pulse which is transmitted to the control module to open or close current flow in the primary circuit. Auto manufacturers have established various names for the switching devices they use, but all perform similar functions.

Manufacturer	Stationary Pickup Coil	Rotating Trigger Wheel
AMC	Sensor	Trigger Wheel
Chrysler	Pickup Coil	Reluctor
Ford	Stator	Armature
GM	Pole Piece & Magnetic Pickup	Timer Core

The dwell period, or in the case with EIS, the period of time the primary circuit is on, is controlled by the electronic module. This time period changes with engine speed on some systems.

The primary circuits of the EIS can be tested with oscilloscopes, special circuit testers, *or simple voltohmmeters*. Specifications and procedures of the ignition and test equipment manufacturers should always be closely followed.

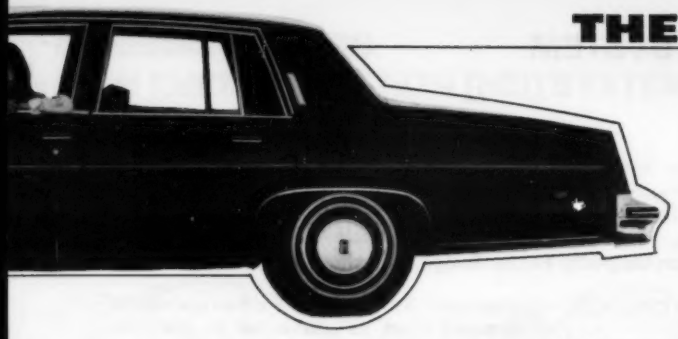
The following pages contain basic troubleshooting procedures for American Motors, Chrysler, Ford and General Motors' electronic ignition systems. All tests are made with voltohm test equipment or with a test lamp, and are suitable for use on emergency service calls or in routine procedures in the hobby shop.

SPARK PLUG REPLACEMENT VS. ELECTRONIC IGNITION SYSTEMS

Because of the operational makeup of the conventional breaker-type ignition system, a 10,000 mile plug change recommendation has been, and will continue to be a reasonable and realistic policy. This recommendation is not based on the fact that spark plugs are actually "worn out," in the strictest sense, after 10,000 miles of service. This figure represents a point beyond which worn plugs are likely to misfire during the peak voltage demands of sudden acceleration. Misfire will result in a loss of power and economy. Also, worn spark plugs contribute to starting failures, a problem which is compounded by wet or cold weather.

Electronic ignition systems, as efficient as they are, do not change the environment in which the spark plug must operate. High combustion temperatures, chemical attack, and high voltage discharges will continue to determine the service life of the plug. Periodic replacement will always be necessary to maintain best economy and performance. A good replacement policy for cars with electronic ignition systems is on the basis of at least once a year.

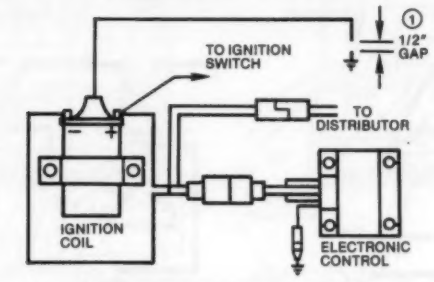
NOTE: The specifications and procedures listed here are for Electronic Ignition Systems and are not applicable to the Chrysler Lean Burn, Ford EEC or General Motors EST-MISAR computerized systems.

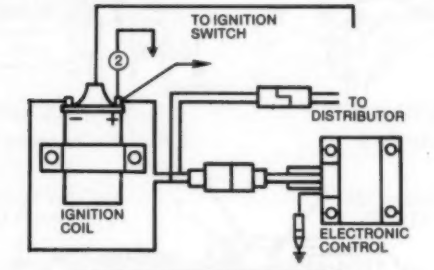


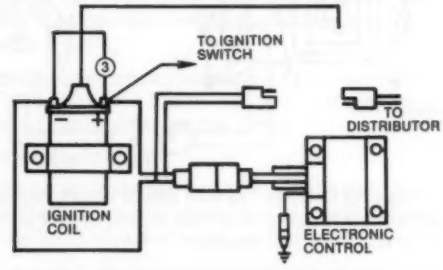
AMERICAN MOTORS BREAKERLESS INDUCTIVE DISCHARGE IGNITION SYSTEM 1975-1977

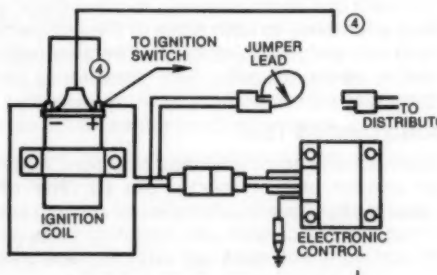
BEFORE YOU BEGIN:

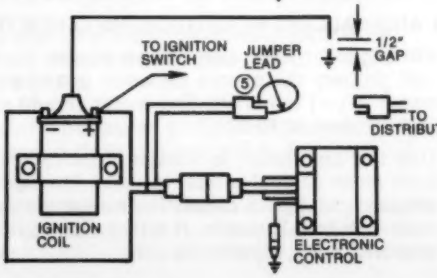
- **Check Fuel Delivery.**
- **Check Battery Cranking Voltage — 9.5 Volts Or More.**
- **Check All Primary and Secondary Wiring For Damage and Loose Connections.**
- **Ignition On, Crank Engine, Check For Spark at Spark Plug.**
- **Use 12-Volt Test Lamp (No. 57 Bulb) and Ohmmeter For These Tests.**











1. Remove coil wire from distributor cap and hold it ½ inch from ground. Crank the engine and watch for steady spark. If spark occurs, ignition primary is OK. The problem is in the cap, rotor or cables.
2. If no spark occurs, connect test lamp from positive (+) terminal on coil to ground. Turn ignition switch to both ON and START. The lamp should light in both positions. If not, fault is in circuit between battery and coil.

CONTROL UNIT TEST

3. If lamp lights in both positions of Step 2, connect lamp across positive (+) and negative (–) terminals of coil. Unplug the sensor leads near distributor and turn ignition ON. If lamp does not light, check control unit ground connection. If ground is OK, control unit is defective and must be replaced.
4. If lamp lights in Step 3, short across terminals in sensor lead coming from control unit. If lamp does not go off, fault is in control unit.

COIL TEST

5. If lamp goes off in Step 4, remove lamp and re-establish ½ inch gap from coil wire to ground. Short across terminals of sensor lead as in Step 4. If spark does not occur each time terminals are shorted, coil is faulty.
6. With ignition OFF, use an ohmmeter to measure coil primary resistance between positive (+) and negative (–) terminals. The meter should read 1.25 to 1.40 ohms. Measure secondary resistance between center tower and positive (+) coil terminal. The meter should read 9,000 to 15,000 ohms. If either test is not within specifications, replace coil.

SENSOR TEST

7. If spark occurs from coil when sensor terminals are shorted in Step 5, fault is in sensor or control unit. Using an ohmmeter, measure sensor resistance at distributor leads. The meter should read 1.6 to 2.4 ohms at 77° to 200° F. Tap sensor lightly; resistance should not vary. If resistance is not within limits, replace sensor.
8. Connect one ohmmeter lead to either sensor lead; touch other lead to center core of sensor. The ohmmeter must show open circuit.
9. If sensor passes these tests, the problem is most likely in the control unit. Replace control unit and retest.

continued

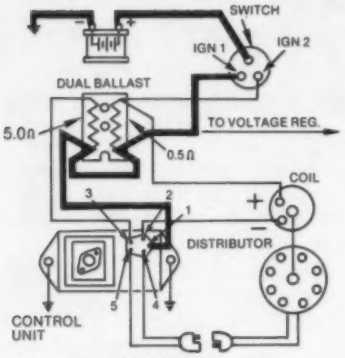
CHRYSLER ELECTRONIC IGNITION SYSTEM 1972-1978

BEFORE YOU BEGIN:

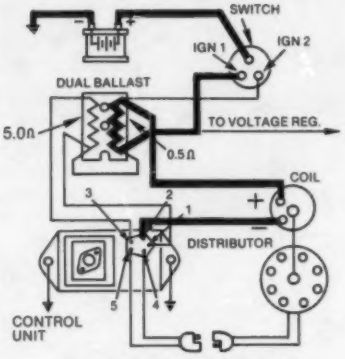
- **Check Fuel Delivery.**
- **Check Battery Cranking Voltage — 9.5 Volts Or More.**
- **Check All Primary and Secondary Wiring For Damage Or Loose Connections.**
- **Ignition On, Crank Engine, Check For Spark at Spark Plug.**
- **Check Air Gap Between Reluctor and Pickup Coil With Non-Magnetic Feeler Gauge. Gap should be .008".**

CAUTION: *Do not touch transistor on control unit when ignition is ON. Sufficient voltage is present to produce severe shock.*

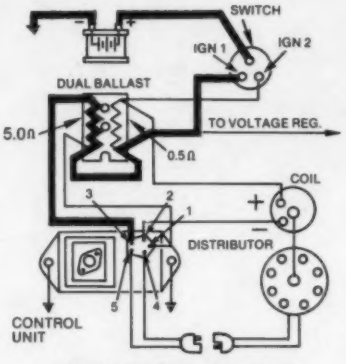
CAUTION: *Ignition switch must be OFF when connector is removed from, or connected to, the control unit.*



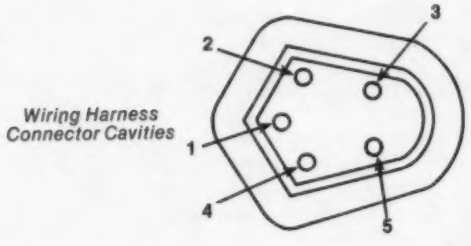
Circuit for Connector No. 1

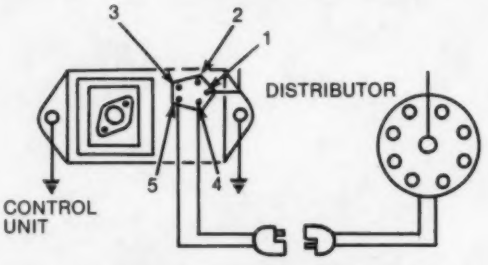


Circuit for Connector No. 2



Circuit for Connector No. 3





1. With ignition OFF, remove wiring harness connector from ignition control unit.
2. Turn ignition ON and connect voltmeter negative lead (–) to ground.
3. Connect voltmeter positive (+) lead to harness connector cavity #1. With ignition ON and all accessories OFF, voltage should be within 1 volt of battery voltage. If not, trace and repair circuit illustrated.
4. Repeat Step 3 at harness connector cavity #2. If voltage is not within 1 volt of battery voltage, trace and repair circuit illustrated.
5. Repeat Step 3 at harness cavity #3. If voltage is not within 1 volt of battery voltage, trace and repair circuit illustrated.

PICKUP COIL TEST

6. With ignition OFF, connect ohmmeter to harness connector cavities #4 and #5. Pickup coil resistance should read between 150 and 900 ohms.
7. If the pickup coil resistance is out of limits in Step 6, disconnect dual-lead connector from distributor and check resistance through pickup coil leads at distributor.
8. If reading in Step 7 is still out of limits, replace pickup coil. If reading is within limits, check wiring from control unit to distributor.
9. Connect one ohmmeter lead to ground and the other lead alternately to both sides of the pickup coil, dual-lead connector, at distributor. The ohmmeter should show open circuit. Any continuity indicates grounded pickup coil.

GROUND CIRCUIT TEST

10. Connect one ohmmeter lead to ground and the other to control unit connector pin #5. The ohmmeter should show continuity between ground and pin #5. If not, tighten control unit mounting bolts and retest. If continuity still does not exist, replace control unit.

COIL AND BALLAST RESISTOR RESISTANCE TESTS

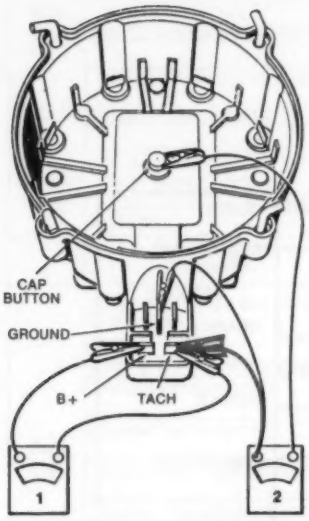
11. With ignition OFF, use the ohmmeter to measure coil primary resistance between positive (+) and negative (–) terminals. The meter should read 1.41 to 1.79 ohms at 70-80° F.
12. Use the ohmmeter to measure resistance across both sides of dual ballast resistor. The normal side should read .5 to .6 ohms. The auxiliary side should read 4.75 to 5.75 ohms. If either side is not within specifications, replace the unit.

GENERAL MOTORS HIGH ENERGY IGNITION (HEI) SYSTEM 1974-1978

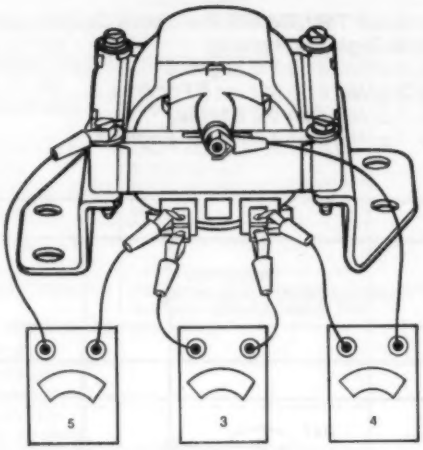
continued

BEFORE YOU BEGIN:

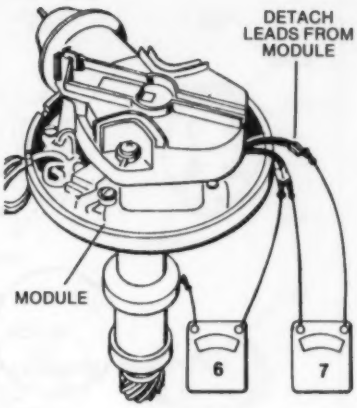
- **Check Fuel Delivery.**
- **Check Battery Cranking Voltage — 9.0 volts or more.**
- **Check All Primary and Secondary Wiring For Damage and Loose Connections.**
- **Ignition On, Crank Engine, Check For Spark at Spark Plug.**
- **Use Voltmeter and Ohmmeter For These Tests.**



HEI V-8 and V-6 Coil Test Points



HEI 4- and 6-Cylinder Coil Test Points



HEI System Pickup Coil Test Points

1. Be sure that all four distributor cap latches are secure and that coil and coil cover screws are tight on V-6 and V-8 units.
2. Connect voltmeter negative lead (–) to ground and positive lead (+) to BAT terminal on distributor. (4, 6 & 8 cyl. w/coil in distributor cap only).
3. Turn ignition switch ON.
4. The voltmeter should read approximate battery voltage. If reading is zero, circuit is open between battery and distributor. Trace and repair as required.

IGNITION COIL TEST

5. Remove cap and coil assembly from V-6 and V-8 distributors by releasing four latches. Coils for in-line 4 and 6 cylinder systems are mounted separately from distributor on earlier production cars.
6. Visually inspect cap, coil and rotor for signs of cross firing and leakage.
7. Make resistance tests with an ohmmeter, as follows, for each system:

V-6 AND V-8 HEI SYSTEMS; 1978 AND LATER IN-LINE 4 AND 6 CYLINDER SYSTEMS (WITH COIL IN DISTRIBUTOR CAP):

a) Test point 1 measures primary resistance. Ohmmeter should show continuity (0 to 1 ohm). If not, replace coil.

b) Connect ohmmeter both ways, Step 2. Use high scale. Replace coil *only if both readings are infinite.*

1975-'77 IN-LINE 4 AND 6 CYLINDER SYSTEMS (WITH COIL MOUNTED SEPARATELY):

a) Test point 3 measures primary resistance. Ohmmeter should show continuity (0 to 1 ohm). If not, replace coil.

b) Test point 4 measures secondary resistance. If reading is more than 30,000 or less than 6,000 ohms, replace coil.

c) Test point 5 should show infinite resistance (open circuit). If resistance is less than infinite, replace coil.

HEI PICKUP COIL TESTS

8. Connect a vacuum source to vacuum advance unit and check vacuum advance operation. If vacuum unit is inoperative, replace it.
9. Detach two pickup coil leads from control module in distributor.
10. Connect ohmmeter to test point 6 and operate vacuum advance through full range.
11. Resistance between either of the pickup coil leads and the distributor housing must be infinite. If not, replace pickup coil.
12. Connect the ohmmeter to pickup coil leads (test point 7) and operate vacuum advance through full range. If ohmmeter reads less than 500 or more than 1500 ohms, replace pickup coil.
13. If no defects have been found in the ignition coil or pickup coil and ignition is still faulty, check the module with an approved module tester. Follow module tester manufacturer's directions. If module is faulty, replace.

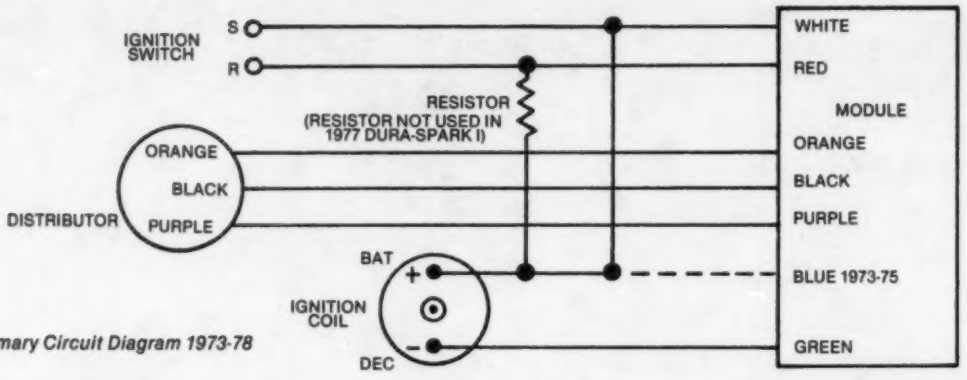
continued

FORD SOLID STATE AND DURA-SPARK IGNITION SYSTEMS 1973-1978

BEFORE YOU BEGIN:

- **Check Fuel Delivery.**
- **Check Battery Cranking Voltage — 9.5 Volts Or More.**
- **Check All Primary and Secondary Wiring for Damage and Loose Connections.**
- **Ignition On, Crank Engine, Check For Spark at Spark Plug*.**
- **Use Voltmeter, Ohmmeter, and Jumper Wire For Tests.**
- **Follow Chart and Diagrams For Year Of Vehicle.**

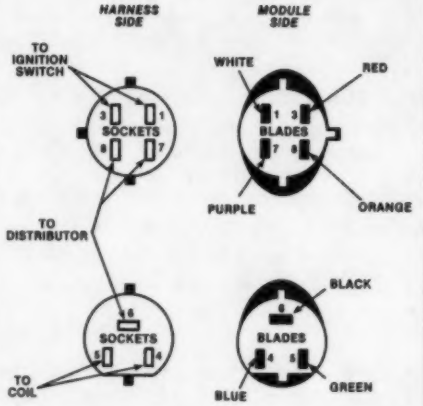
**CAUTION:* *For Spark Test, Do Not Pull These Cables While Engine Is Running:*
No. 1 or No. 8 on V-8 Engines
No. 3 or No. 5 on In-Line 6 Engines
No. 1 or No. 4 on V-6 Engines
No. 1 or No. 3 on 4-Cylinder Engines



Ignition Primary Circuit Diagram 1973-78

1973-74 SOLID STATE

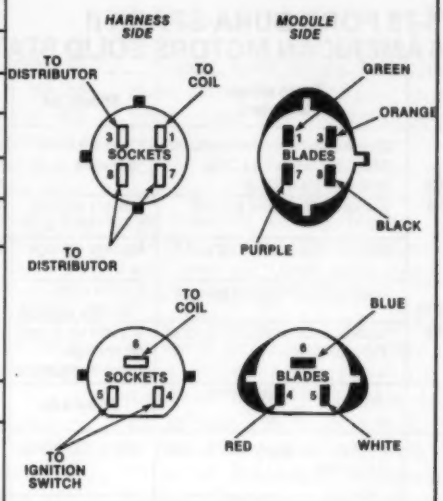
	Test Voltage Between	Should Be	If Not
Key On	Coil BAT terminal and ground. (Module connected, DEC terminal grounded)	4.9 to 7.9 volts	Low reading - Check primary wiring. High reading - Replace resistance wire
	Socket 3 (Red) and ground	Battery voltage ± 0.1 volt	Repair red wire, check connectors
	Socket 5 (Green) and ground	Battery voltage ± 0.1 volt	Check green wire to coil, check coil
Crank-ing	Socket 1 (White) and ground	8 to 12 volts	Repair white wire, check connectors
	Socket 5 (Green) and ground	8 to 12 volts	Check green wire to coil, check bypass circuit
	Socket 7 (Purple) and Socket 8 (Orange)	0.5 volt ac or any dc voltage	Replace magnetic pickup (stator)
	Test Resistance Between	**Should Be**	**If Not**
Key Off	Socket 7 (Purple) and Socket 8 (Orange)	400 to 800 ohms	Replace magnetic pickup (stator) or repair ground connection
	Socket 6 (Black) and ground	0 ohms	
	Socket 7 and ground	more than 70,000 ohms	
	Socket 8 and ground	more than 70,000 ohms	
	Socket 3 (Red) and coil tower	7,000 to 13,000 ohms	Replace coil
	Socket 5 (Green) and Socket 4 (Blue)	1.0 to 2.0 ohms	
	Socket 5 (Green) and ground	more than 4.0 ohms	Check for short at coil DEC terminal or in wiring to DEC terminal
	Socket 3 (Red) and Socket 4 (Blue)	1.0 to 2.0 ohms	Replace resistance wire



continued

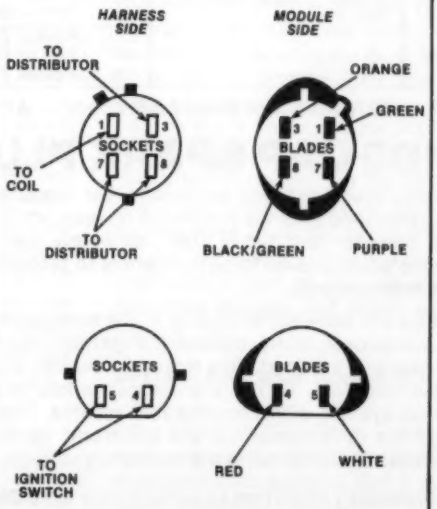
1975 SOLID STATE

	Test Voltage Between	Should Be	If Not
Key On	Coil BAT terminal and ground (Module connected, DEC terminal grounded)	4.9 to 7.9 volts	Low reading - Check primary wiring. High reading - Replace resistance wire
	Socket 4 (Red) and ground	Battery voltage ± 0.1 volt	Repair red wire, check connectors
	Socket 1 (Green) and ground	Battery voltage ± 0.1 volt	Check green wire to coil, check coil
Cranking	Socket 5 (White) and ground	8 to 12 volts	Repair white wire, check connectors
	Socket 6 (Blue) and ground (Jump socket 1 to 8)	more than 6 volts	Check coil connections, check bypass circuit
	Socket 3 (Orange) and socket 7 (Purple)	0.5 volt ac or any dc voltage	Replace magnetic pickup (stator)
	Test Resistance Between	**Should Be**	**If Not**
Key Off	Socket 3 (Orange) and Socket 7 (Purple)	400 to 800 ohms	Replace magnetic pickup (stator) or repair ground connection
	Socket 8 (Black) and ground	0 ohms	
	Socket 3 and ground	more than 70,000 ohms	
	Socket 7 and ground	more than 70,000 ohms	
	Socket 4 (Red) and coil tower	7,000 to 13,000 ohms	Replace coil
	Socket 1 (Green) and Socket 6 (Blue)	1.0 to 2.0 ohms	
	Socket 1 (Green) and ground	more than 4.0 ohms	Check for short at coil DEC terminal or in wiring to DEC terminal
	Socket 4 (Red) and Socket 6 (Blue)	1.0 to 2.0 ohms	Replace resistance wire



1977-78 DURA-SPARK I

	Test Voltage Between	Should Be	If Not
Key On	Socket 4 (Red) and ground	Battery voltage ± 0.1 volt	Repair red wire, check connectors
	Socket 1 (Green) and ground	Battery voltage ± 0.1 volt	Check green wire to coil, check coil
Cranking	Socket 5 (White) and ground	8 to 12 volts	Repair white wire, check connectors
	Coil BAT terminal and ground (Jumper socket 1 to 8)—less than 30 seconds	more than 6 volts	Check coil connections, check bypass circuit
	Socket 3 (Orange) and Socket 7 (Purple)	0.5 volt ac or any dc voltage	Replace magnetic pickup (stator)
	Test Resistance Between	**Should Be**	**If Not**
Key Off	Socket 3 (Orange) and Socket 7 (Purple)	400 to 800 ohms	Replace magnetic pickup (stator) or repair ground connection
	Socket 8 (Black) and ground	0 ohms	
	Socket 3 and ground	more than 70,000 ohms	
	Socket 7 and ground	more than 70,000 ohms	
	Socket 4 (Red) and coil tower	7,000 to 13,000 ohms	Replace coil
	Coil BAT and DEC terminal	0.5 to 1.5 ohms	
	Socket 1 (Green) and ground (2-wire connector connected)	more than 4 ohms	Check for short at coil DEC terminal or in wiring to DEC terminal



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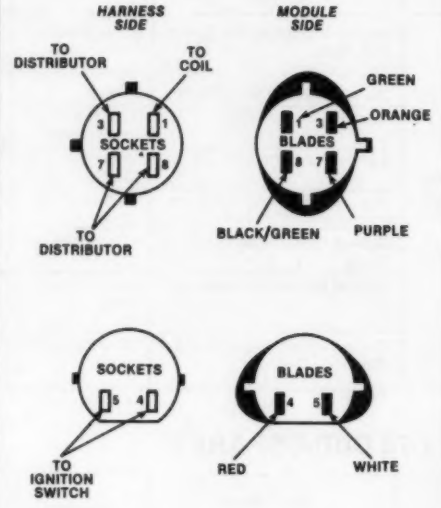
1976-78 FORD DURA-SPARK II
1978 AMERICAN MOTORS SOLID STATE IGNITION (SSI)

	Test Voltage Between	Should Be	If Not
Key On	Coil BAT terminal and ground (Module connected DEC terminal grounded)	4.9 to 7.9 volts *6.0 volts ± .5	Low reading - Check primary wiring. High reading - Replace resistance wire
	Socket 4 (Red) and ground	Battery voltage ± 0.1 volt (* ± .2)	Repair red wire, check connectors
	Socket 1 (Green) and ground	Battery voltage ± 0.1 volt	Check green wire to coil, check coil
Cranking	Socket 5 (White) and ground	8 to 12 volts *Battery voltage	Repair white wire, check connectors
	Socket 3 (Orange) and Socket 7 (Purple)	0.5 volt ac or any dc voltage *Any fluctuation	Replace magnetic pickup (stator)
	Test Resistance Between	**Should Be**	**If Not**
Key Off	Socket 3 (Orange) and Socket 7 (Purple)	400 to 800 ohms	Replace magnetic pickup (stator) or repair ground connection
	Socket 8 (Black) and ground	0 ohms	
	Socket 3 and ground	more than 70,000 ohms	
	Socket 7 and ground	more than 70,000 ohms	
	Socket 4 (Red) and coil tower	7,000 to 13,000 ohms	Replace coil
	Coil BAT and DEC terminal	1.0 to 2.0 ohms	
	Socket 1 (Green) and Socket 4 (Red)	3.0 to 4.0 ohms–1976	Check for short at coil DEC terminal or in wiring to DEC terminal
		1.7 to 3.7 ohms–1977 (*'78 SSI)	
	Socket 4 (Red) and coil BAT terminal	1.0 to 2.0 ohms–1976	Replace resistance wire
		0.7 to 1.7 ohms–1977 *'78 1.35 ohms	



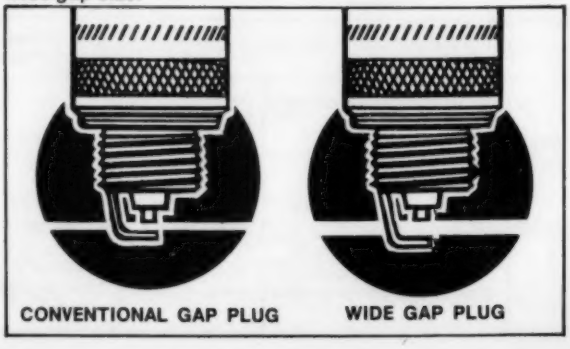
**1978 American Motors SSI Specs — All Others Same as Ford*

WIDE GAP SPARK PLUGS

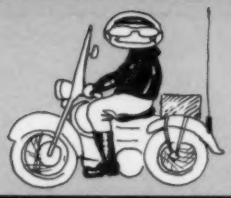
To help reduce exhaust emissions, car manufacturers have developed engines to operate on lean, air/fuel mixtures. The standard gap of .035″, so widely specified in previous years, proved to be too narrow to properly ignite the leaner mixtures.

To allow for more arc exposure to the combustible mixture and subsequently improve the ignition process, the plug gap was widened. This remedy, however, posed yet another problem. To fire a wider gap would require an ignition system with considerable reserve. This accelerated the development of the electronic ignition systems which could provide the necessary voltage.

It is especially important to consult your 1978 Champion Recommendations Catalog when replacing spark plugs in Ford and General Motors cars, as they are the primary users of wide gap plugs. Wide gap plug sizes now range from .044″ to .080″ in automotive engines. Check the specifications closely, as wide gap plugs and conventional types have the same basic numbers. The only difference is a numerical suffix added to identify the wide gap size.



BACKFIRE
LETTERS to the EDITOR



WE'RE SIMPLE

I ordered your "Backyard Mechanic" Volumes 1 and 2 and received them in a short time. I had kind of given up when I didn't receive the first volume the first time.

Now that I have your volumes, I am really glad that I reordered. I am the kind of guy who buys all the maintenance manuals when I buy a new car. I did this with my '74 Camaro, but with all the technological changes made in auto engines and hodge podge hanging out of our engines, and volumes of tech manuals and sophisticated test equipment and tools involved in keeping our cars in shape, the simplicity of your volumes was truly refreshing. I have used them already and have helped others. I have no wish to remove my old manuals from storage.

MSgt Fred J. Thompson, USAF
5943 Hickam Drive
Dayton, OH 45431

Thanks for the kind words. Sorry, folks, we're all out of Volume 1.

THE POLICE IMAGE?

Having read your reply to Lt Col Schruefer in the Jan '78 "Backfire," I take plaint with the inference that the lights of a motorcycle should be on to give the rider more visibility. If a car driver cannot see and rationalize a motorcycle, that person should not be allowed to drive as, theoretically, he is not able to see children, dogs, and small people. Absurd? No! Most motorcycles weigh several hundred pounds, plus a person or two on it, and the noise that is innate to an air-cooled engine should make them apparent to all but the mentally incompetent.

Thinking of the lights-on issue brought to mind the story of the biker who was struck by a lady who in self-defense claimed, "I didn't see you." Since his bike was destroyed, he was in the market for another. The local police department was in the midst of switching to "Motto Guzzi" so he purchased an old Harley minus the police logo and other paraphernalia. He bought a quasi police uniform, CB radio, windshield, and other miscellaneous parts and went cruising the highways. No one cut off the pseudo-cop, no one tailgated him, nor did anyone speed past him. Why? Because they thought they saw someone they fear and what could be done to them if they did their inane acts – an omnipotent cop, not a helpless biker.

That's all the visibility one needs – a uniform, a book of tickets. 'Til they give me that power, when I ride I will continue to curse, make obscene gestures, and in general let people know that I am there and plan on staying there.

Rather than treat the effect, cure the illness. And that malady be: incompetent drivers of cars, lack of driver education for bikers, and the hinderance in the form of the DOT's meddling into an area they know little about.

As so eloquently said by many others, "Let those who ride decide."

Sgt Peter L. Adamski, USA
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Chievres Det
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Sgt Adamski is right. Drivers do see policemen on motorcycles more readily than they see other riders. There are a lot of subconscious factors at work. The real point is that it is in the cyclist's interest to make himself as visible as possible to the motorist because in any collision between the two the cyclist is the one who does the bleeding. And usually such collisions are the motorist's fault. Not fair, but that's the way it is.

SAFETY GEAR

I have been riding motorcycles for seven years and appreciate your magazine's concern on informing military personnel on good motorcycle safety.

Maybe I am wrong but I have not come across in any of your articles on safety gear any information to the prescribing directives as to the wearing of safety gear with the military uniform. I have been questioned on the wearing of my leather jacket, gloves, boots, fluorescent/reflectorized vest and other such items along with the military uniform.

So if I could, I would like to pass on some information to other motorcycle riders, particularly Air Force members. AFR 35-10, table 3-1, line 15, informs you to see note 3. Note 3 in turn tells you to see AFR 127-5, "Use of Protective Equipment by Vehicle Operators and Passengers." Some time should also be spent looking into Squadron, Base and Command directives/policies. Knowing what can be worn with the uniform will benefit both the biker and non-bikers.

SSgt Dale Kuchenmeister, USAF
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Protective equipment may be worn with the uniform only when the rider is actually on the motorcycle. Commanders who fuss usually do so because riders fail to remove their protective gear when they leave the bike. Motorcyclists can't browse in the PX wearing the uniform with helmet and gloves. When you dismount, put on your hat. The traffic people here in the Safety Center have been trying to get permission for motorcyclists to wear a full snowmobile suit in bad weather. It just came through and details were in our last issue.

BRITISH CAR MAINTENANCE

As a "backyard mechanic" myself, I read your publication with a great deal of interest each month. I find it informative, interesting, and usually accurate.

continued

backfire

continued

Being the owner/maintainer of three British sports cars, two TR-6s and one XKE, I want to point out some things which are peculiar to the TR-6. (My daughter owns one of the TR-6s and can do much of the maintenance, including oil filter changes, herself.)

The brake fluid master cylinder check is much easier than the picture shows. Both front and rear sections of the reservoir are clearly visible *through* the plastic container without having to open the top. It isn't bad for a TR owner to know that the disk brake/front system will cause a gradual "loss" of fluid as the disks wear down which is normal – loss of fluid to the rear system should be investigated since this "shoe" system doesn't normally show a lowering fluid level.

Another good hint for people who own combination disk/shoe brake systems which don't feature "self-adjusting" brakes (like the TR-6) is that the front disk brakes *do* "self-adjust" but the rear shoes don't. You can easily detect when the rear shoes need adjusting by monitoring the travel of the emergency brake handle/pedal, thus assuring good equal braking action on all *four* wheels plus avoiding faster wear out of the overworked front pads.

Changing disk pads is so simple on most cars (including the TR) as opposed to the cost and bother of replacing the *disk*, my suggestion here is to check pad thickness at regular maintenance intervals, like when you've got the wheels off rotating tire positions.

On the closed cooling system in the TR, it is not necessary to remove the main radiator cap to check the coolant level. Again, the translucent plastic bottle provided for expansion/overflow is easily checked visually, without removing any caps.

I am surprised you didn't cover one of the best indicators of PM (or the need for some) and that's checking *under* the car after it has been parked for awhile. I've caught more incipient problems this way than the rest combined. (The TR-6 lever shocks (rear) are a good example here. At about $75 per copy, it's much easier to refill a slightly leaking shock every month than it is to replace one after it runs completely out and ruins the internal seal, which is not replaceable.)

A little Armorall on the interior plastic sure saves a lot of expensive repair and replacement on the padded trim.

The TR-6 (and most British cars) comes with a great owner's handbook and shows you how to do all these things and more – easily and simply.

Keep up the great crusade. Maybe the car owners will come to understand and care for their vehicles much better because of your excellent articles.

Capt R.S. Zeisel, USN
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. . . Radiator hoses should be inspected regularly for evidence of ensuing failure in the form of cracking and dry rot which occur with age. The radiator hoses on all TR-6s, as well as many other foreign cars, are covered with a reinforcing fabric which hides the true condition of the hoses. The picture which demonstrates how to check the level in the radiator expansion tank provides a good view of the hose cross-section which must be inspected to obtain a true indication of the condition of a fabric-covered hose.

A check which is equal in importance to the illustrated fan belt tension check is a determination of the condition of wear of the fan belt. Frayed rubber/fabric as well as cracks on the fan belt's pulley contact surface are indications of excessive wear which necessitate replacement.

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EUROPEAN DRIVERS

I just returned from a brief vacation in Spain during which I put over 800 miles on a rented "Seat 127," the Spanish equivalent to the Fiat. Based on my experience in Spain, and elsewhere in Europe, I now have an even lower tolerance for people who, in their ignorance, label all Europeans as "bad drivers." Actually, the opposite is true. The average European driver is a skilled driver well adapted to his challenging driving environment.

A higher degree of alertness is demanded in European driving than in the U.S. Congestion, two-lane roads, and rapid changes in diverse road conditions command full attention. In the U.S., extensive freeways and long, straight stretches of wide roads and relative lack of congestion seem to encourage and permit laziness. The lazy driver will not survive in Europe.

I suggest people who think the European driver is a bad one should take a closer look. The conditions are different and some of the rules are different. But when you compare sound decisions and quick reactions behind the wheel in response to demanding situations and conditions, I think the average European driver rates much higher than the average U.S. driver.

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And, dear readers, please know that this is a former editor of DRIVER speaking!

double clutch

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They view "trigger" films of accident situations. The films are designed to get the class to talk about who caused the accident and why.

John Pickett, director of the Dallas Office of Traffic Safety, explains that with the increased complexity of society, laws are often made which do not please every member of society. When this occurs, many persons may not believe the law applies to them or believe that such a law does not apply equally to them. With the use of interaction and group discussion through transactional analysis methods, the law becomes more acceptable to the individual and he may change his driving behavior.

The first Dallas group to take the training finished in March. Pickett expects it will take 18 to 24 months before an accurate evaluation of such training can be made.

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The DRIVERS

A1C Roberta Watson, 1965th Communications and Installation Group, Norton AFB, is shining up the brand-new moped she won at an Easter Seal dance-a-thon. Bert danced 24 hours to win the Puch and help the Easter Seal Foundation raise over $600. Of course, she's getting lots of advice from her friends in the 1965th about taking care of her prize: SSgt Robert Garcia tells her how to maintain the machine safely, and SSgt Alan Koester talkes to her about trading in that cap for a helmet. If anybody could be looking good in a helmet, it's Bert! A native of Coldwater, Michigan, Bert's Air Force job is repairing radios.

(Photos by Bob Lapine)